

Title: ALL-UNION THERMOTECHNICAL INSTITUTE imeni F. DZHERZHINSKIY (USSR)
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CONFIDENTIALALL-UNION THERMOTECNICAL INSTITUTE imeni F. DZERZHINSKIY(VTI)

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Location:

Moscow, 14 Leninskaya Sloboda.

Telephone: Exchange Zh-1-90-60

Telephone: Admin Zh-1-21-21

VTI is subordinate to the Main Administration of the Power Economy of the Ministry of Heavy Industries (Glavenergo MNTF).

Director:

Engineer A. A. Yurkin

VTI conducts scientific research work in the field of thermal engineering for the power economy of the USSR, suggests methods for the utilization of local and low quality fuels, and recommends installations for thermal power stations as well as hydroelectric power stations and problems of their operation.

Laboratories:

Boiler

District Heating and Steam Turbines

Physico-Technical

Water

Driving

Internal Combustion Engines

Gas

Furnace

Analytic

Liquid Fuels

Technico-Economical Studies

Leading Scientific Personalities:

Prof T. F. Maksimov - Scientific leader of the Lab of District Heating and Steam Turbines

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Prof A. S. Prudvitelev - Scientific leader of the Physico-Technical Lab

Prof A. Ye. Probst - fuel economy

Prof I. M. Rafalevich - Chief of the Furnace Lab

Prof I. P. Chernogubovskiy - gas motors

Prof N. I. Chernozhukov - Chief of the Liquid Fuel Lab

Engineer V. T. Blinov - district heating

Engineer P. N. Borisov - Chief of the Technico-Economical Studies Lab

Engineer A. P. Voroshilov - Theory of drying materials

Engineer D. N. Vyrubov - internal combustion engines

Engineer S. D. Gusev - Chief of the Lab of District Heating and Steam Turbines

T. A. Mikoyev - Chief of the Analytic Lab

A. I. Karelin - fuel analysis

Engineer S. Ya. Kornitskiy - boiler installations and fuel combustion

Engineer Yu. M. Kostrikin - Chief of the Water Lab

Engineer M. Yu. Lur'ye - Chief of the Drying Lab

Engineer V. T. Marchenko - Chief of the Physico-Technical Lab

Engineer A. S. Nevskiy - theory of fuel combustion

Engineer N. L. Oyvin - Chief of the Boiler Lab

Engineer A. M. Regirer, district heating

Engineer E. I. Romm - boiler installations

Engineer I. M. Rotar' - Chief of the Lab of Internal Combustion Engines

Engineer Ya. M. Rubinshteyn - theory of district heating

Engineer A. P. Shakhno - fuel technology

Engineer M. F. Shirokov - district heating

Engineer M. S. Shkrob - preparation of water
A. V.

Engineer/Shcheglyayev - steam turbines

Engineer B. M. Yakub - district heating with steam-powered equipment.

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An old Steam-Electric Power Installation (boiler unit up to 500 kv m) with various types of heating for consumption of various types of fuels, steam turbines (1700 and 2500 kw). These installations are being utilized by Mosenergo.

Steam-Electric Station (high pressure), including 2 Leffler type boilers (130-150 tons per hour at 130 atmospheres and 500 degrees), a Soviet made direct action boiler 150-200 tons per hour at 130 atmospheres and 500 degrees, and a high pressure turbine 125 atmospheres, 470 centigrade and producing 24,000 kw. This installation has also been given into the Mosenergo system.

Industrial Furnaces installed at the Lyubertskiy Plant for Agricultural Construction, Metallurgical Plant "Elektrostal", Moscow "Automobile Plant imeni Stalin, Plant "Izolator".

Experimental Installation at the Institute itself:

Experimental equipment for studying the resistance to gas flow and for studying the coefficient of heat transfer in boiler pipes.

Experimental equipment for high pressure steam generators.

Experimental gas motor and diesel installation.

General number of personnel	735
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Scientific personnel	219
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Annual budget, 1945	46,756,000 rubles
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Basic Problems undertaken at the Institute:

Solution of methods for the consumption of cut peat in large furnaces (T. S. Karyakin);

Solution of methods for the preparation and combustion of Moscow coals in boiler installations (S. Ya. Kornitskiy);

Rational combustion of slate and liquid slag removal, (N. L. Oyvin);

Theoretical problems of combustion and heat transmission in boiler and power installations;

Obtaining high pressure steam at Steam-Electric Power Stations

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Basic Problems undertaken at the Institute (Cont'd):

and utilization and assembly of high pressure steam boilers of ordinary construction.

Construction of thermal measuring instruments and automatic regulating devices for heat control (Gerasimov);

Separating sulfur compounds from smoke (A. S. Predvoditelov);

Problems of district heating: district heating equipment (turbines, heat-exchange equipment), and district heating networks, (T. P. Maksimov);

Solution of problems connected with the general plans for steam supply of large industrial enterprises, (B. H. Yakub);

Gas motors (development of a Soviet-made Gas Motor), I. P. Chernogubovskiy.

Enterprises and Institutes regularly serviced by VTI:

GlavNeft	GlavUgol'	SoyuzAzot
GlavTorg	SoyuzDumaga	SoyuzDizel'
SoyuzSakhar'	SoyuzSlanets	VoKhimTrest
"Koks"	"Stal"	Lashirskaya GRES
Stalinskaya TETs	MosEnergo	Shterovskaya GRES
Kuznets Plant imeni Stalin	Beresniki Chem Combine	
Magnitogorsk Plant	TETs at the Gor'kiy Automobile Plant im Mo- lotov	SoyuzOgneupory
MosUgol'		

Foreign Agencies with which VTI Maintains Liaison:

Massachusetts Institute of Technology, USA (Prof. Sherwood).

VTI Aids Industry on the Following Matters:

Theoretical problems of thermal engineering;

Combustion of various fuels in industrial furnaces and boilers;

Problems relative to the operation of the boiler and turbine

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equipment as well as questions of the chemistry of water utilized at TETs and GRES;

Assembly and firing of industrial furnaces;

Drying technology;

District heating;

Utilization of heavy fuels in internal combustion engines;

Gas motor building.

Periodical Publications of the Institute:

"Izvestiya Vsesoyuznogo Teplo-Tekhnicheskogo Instituta imeni F. Dzerzhinskogo".

This periodical reports the technico-economical problems, as well as theoretical problems, in thermal engineering. It published the scientific results of the laboratories of VTI as well as the results of work conducted by other institutes conducting research in the same general field. This periodical has been published in Moscow since 1924 and appears 10 times a year, containing about 7 printed sheets. The responsible editor is A. A. Mirkin and the per issue price is 20 rubles.

"Byulleten' VTI imeni Dzerzhinskogo" discusses the operational activities of the institute and has been published in Moscow since 1931. It is printed twice monthly and contains 2 printed sheets. Responsible editor is V. K. Shitomirskiy. Subscription free.

The institute was founded in 1921 on the initiative of V. I. Lenin. The assignments of the institute include studies on fuel economy, and the rational utilization of fuel. However, as the institute developed, it took up the study of methods for drying fuels, furnace economy, gasification of fuels, internal combustion engines, etc.

One of the foremost research fields of the Institute has to do with the combustion of low grade and local fuels, and their rational use in the power engineering field.

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Studies on methods for burning fuels were conducted along two lines at the institute: 1) methods for further increasing the efficiency of burning already utilized fuels; and 2) methods for efficient utilization of local fuels and fuels from newly discovered deposits. The institute appears to spend most of its scientific effort studying the characteristics of the Moscow coal basin coals. Much of the actual experimentation is taking and has taken place at the Kashirskiy GRES (Hydroelectric Power Station). Here studies on increasing the efficiency and automatization of the boiler equipment are being conducted. A considerable number of experiments were conducted to determine better methods for burning Moscow coals by the "layer" method. It was found that the layer method of burning coals was satisfactory for small capacity boilers (60 tons per hour). Great difficulty is experienced in the burning of Moscow coals in view of their high moisture, ash, and calchedony content. Special pulverizing [] procedures had to be established. The most efficient was a slow moving ball mill.

New theories were developed with respect to the drying of powdered coal with the result that today most of Soviet furnaces which utilize powdered coal, dry the coal in pipes connected in such a manner as to permit one continuous process from the mill to the furnace. This basic theory was utilized in planning and designing such large power stations as the Stalinogorsk GRES, the Lipets TETs, ^{the Tula TETs,} and the Stalin TETs.

VII is very active in its research on proper utilization of the Uralo-Kuznets Combine coals. Results of these studies resulted in special equipment utilized in the construction and designing of the Sred-neural'sk GRES, the Kizelov GRES, the Barnaul' TETs, and the Alma-Ata GRES.

One of the most important works concluded by the Institute was drawing up a table showing the pulverizing [] capabilities of various

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types of coals. This permits rapid determination of the type of pulverizers [7] which will be best suited for new power stations which are being planned for various localities and which will be operating on locally available fuels.

Much research has gone into determining the best methods for utilization of peat in large industrial furnaces and power stations. It was discovered that the most efficient fuel feed for furnaces using peat was by aerating the peat before it is fed to the combustion chamber. The design of the equipment was such that it was also possible to use the same installation for feeding peat as well as extracting the burnt peat. Designing activities of GlavEnergoProm utilized the aerated theory of peat combustion in their designing of some of the larger power installations in the USSR.

Work on the problem of high pressure installations was started with test [7] station (TETs of VTI which is now part of the Mos-Energo system). The first actual operation of this experimental TETs was planned for the end of 1934.

The institute was also very active in determining the combustion conditions in furnaces, and along with this research studied the reasons for breakdowns in furnaces and heating and power installations.

Tests conducted at the TETs located at the Berezniki Chemical Combine showed that glauconite was a very satisfactory agent for the purification of turbulent water, obtained from rivers for use in boiler installations. A plant for the production of glauconite was in the design stage in 1935. The Institute also developed a method for doping water with phosphorus (phosphatized water) which prevents any boiling. This is a factor which is very important in the technology of high pressure steam boiler installations. Special chemical methods were developed ^{for} cleaning boiler installations from various deposits. Hydrochloric acid and sodium phosphate were recommended as cleaning agents.

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Furthermore, cleaning by the chemical method is considerably less in cost than the mechanical method.

One of the most important tasks conducted by the institute in 1934 was the establishment of a general plan for district heating for the city of Moscow. Research on this field revealed the possibility of manufacturing non-metallic pipes for the conductance of hot water from the central heating plant to the various consumers.

The Physico-Technical Laboratory, VTI is conducting research on those problems of physico-technical matters dealing directly with power engineering. One of the most important projects has to do with control-measuring technology. Other groups at the institute are working on the problem of purifying smoke and isolating important by-products which otherwise would be wasted.

The Analytical Laboratory, VTI has developed a standard method for determining the analysis of fuels. The factors obtained by the laboratory went into the compilation of a table for quality characteristics of Soviet fuels.

The Drying Laboratory, VTI among its equipment has a drum drier which is intended for drying operations on various types of materials (ore, clay, fuel, etc.).

At the present time VTI, in cooperation with GiprotsvetMet, Gipromash and other agencies, is compiling an atlas-catalog on typical Soviet made furnaces.

VTI is also conducting much research on diesel fuels. Plans are also made for studying the possibility of constructing a power station utilizing heavy oils as a fuel for diesel equipment.

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